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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/830,140	04/23/2004	Takashi Okazoe	252019US0CONT	7426
22850	7590	06/08/2006	EXAMINER	
OBLON, SPIVAK, MCCLELLAND, MAIER & NEUSTADT, P.C. 1940 DUKE STREET ALEXANDRIA, VA 22314			HU, HENRY S	
			ART UNIT	PAPER NUMBER

1713

DATE MAILED: 06/08/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/830,140

Applicant(s)

OKAZOE ET AL.

Examiner

Henry S. Hu

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on Election of April 24, 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) 1-10 and 18 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 11-17 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☒ Claim(s) 1-18 are subject to restriction and/or election requirement.

### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 April 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
  - 2) ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - 3) ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 6 pages.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

### DETAILED ACTION

1. This Office Action is in response to Election filed on April 24, 2006. **Applicant's election of Group III, Claims 11-17 is traversed with remarks on page 2.** The traversal is on the ground(s) that it would not place an undue burden to search and examine the non-elected Group I (Claims 1-9), Group II (Claim 10) and Group IV (Claim 18) with the elected Group III since they are so closely related in the field of fluorosulfonyl-containing fluoropolymers. Compounds described in Claim 10 (Group II) and Claim 18 (Group IV) can be found inside Claims 11-17 (Group III). This is not found persuasive because each group is drawn to a technology apparently requiring search in different classification area. In the instant case, each group is distinct from other group. To be more specific, Group I was drawn to a fluorosulfonyl group-containing compound (5) from fluorination of starting compound (3) into compound (4) and then decomposing compound (4), Group II was drawn to a method of making compound (7-1) from thermally decomposing compound (5-1), Group III was drawn to a method of making a fluorosulfonyl group-containing homo- or co-polymer having repeating units of compound (7-1), while Group IV was drawn to a total four-step synthesis of a specific compound (7-10) from starting compound (3-10) via (4-10), (5-10) and (6-10) but no reaction conditions are shown.
2. In a very close examination, Group III may use the monomer of (7-1) to make polymers, while Group II and Group IV are related to some specific process and/or sequence to achieve monomer (7-1). The monomer (7-1) may be produced from other method, which involves

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different intermediates and/or starting material. Same reason may be applied as compound (5-1) of Group II may be not produced by a combination of intermediate (4-10) and starting material (3-10). The process of making or using is unique and thereby not interchangeable. Therefore, the scope of the claims, i.e., the metes and boundaries are distinct.

The requirement is still deemed proper and is therefore made FINAL. **Claims 1-18** with a total of seven independent claims (**Claims 1, 10-12, 15 and 17-18**) are now pending, while nonelected **Claims 1-9 (Group I), Claim 10 (Group II), and Claim 18 (Group IV)** are all withdrawn from consideration. An action follows.

### *Specification*

3. The disclosure is objected to because of the following informalities:

Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract on pages 76-77 has two paragraphs. The examiner suggests the removal of the tab on the second paragraph starting with "A compound (3)" so that it combines with the first paragraph.

The abstract should be in narrative form and generally **limited to a single paragraph** on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

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The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

Appropriate correction is required.

*Claim Rejections - 35 USC § 112*

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 13 and 15 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 13 at line 2 and Claim 15 at lines 10-11 provide a fluorosulfonyl group-containing polymer, however, the language of "**molecular weight**" causes indefiniteness. It is known that **depending upon the methodology for measurement, there are number-average molecular weight, weight-average molecular weight, and viscosity-average molecular weight**. The reporting number can be very much different. Therefore, the applicants need to define how the molecular weight is measured in order to clarify the confusion.

*Claim Rejections - 35 USC § 103*

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5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

- (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

6. *The limitation of parent Claim 11 in present invention relates to a process for producing a fluorosulfonyl group-containing polymer, characterized by polymerizing at least one member of the following compound (7-1), or at least one member of the following compound (7-1) and at least one member of a polymerizable monomer which is copolymerizable with the compound (7-1).*

*Parent Claims 12, 15 and 17 are related to polymers comprising repeating units of monomer (7-1) in Claim 11; while parent Claim 17 is related to monomeric compound (7-1A), which is more specified than (7-1). See other limitations of dependent Claims 13-14 and 16.*

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7. Claims 11-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kazuya et al. (JP 05213929) in view of Connolly et al. (US 3,282,875).

Regarding the monomer/polymer limitation of four parent **Claims 11, 12, 15 and 17**, **Kazuya et al.** have already disclosed the preparation of a class of five-member-ring compounds such as **perfluoro-2-methylene-4-propyl-1,3-dioxorane** with a general chemical structure of **formula (I)**, and also disclose many polymers comprising such a unique repeating unit (abstract, line 11; see synthetic schemes on pages 3-4). The key point on the preparation of formula I) is that the compound of formula (I) can be obtained by **thermal decomposition of a compound of formula (II) with X being F or OM**; while showing on column 6 at lines 1-19 the compound (D) of formula (II) can be obtained by **a two-step reaction with alpha-keto-carboxylic fluoride (C) as starting material and a six-member-ring intermediate (G)**. Kazuya further discloses that such obtained fluoropolymers are particularly with unconventionally low refractive index.

8. In a very closed examination, Kazuya is only silent about preparing the compound of formula (I) with fluorosulfonyl functional group to be attaching on the R<sup>1</sup> group at the end position. Connolly teaches that monomer and its polymer carrying an ether linkage with fluorosulfonyl end functional group can be prepared through the same thermal decomposition of the same kind of acid fluoride as already specified above by Kazuya (see column 1, line 17-37; column 1, line 66 – column 2, line 36; see all working examples on columns 3-9). By doing so, the fluorosulfonyl groups in the polymer is readily subjected to many known reactions of

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sulfonyl groups so as to produce many ionomeric products with unique properties well known in the art to be useful in the area of battery and fuel cell (column 2, line 68 – column 3, line 8).

In light of the fact that both involving references are dealing with making fluorine-containing polymers particularly with ether type linkage, one having ordinary skill in the art would therefore have found it obvious to perform synthetic methodology so as to modify Kazuya's monomer preparation process with the attachment of fluorosulfonyl functional group on the R<sup>1</sup> group at the end position as taught by Connolly. By doing so, one would expect it succeed in substantially lowering refractive index. Additionally, many ionomeric products with unique properties well known in the art to be useful in the area of battery and fuel cell may be thereby obtained.

9. Regarding **Claims 13 and 16**, both references have demonstrated the preparation of many copolymers from fluorosulfonyl-containing monomer (see all working examples).

Regarding **Claim 14**, sulfonic acid or its metal salt in the form of monomer or polymer can be readily obtained from the conversion of fluorosulfonyl functional group with alkali hydrolysis (see Connolly at column 3, line 58-69 as well as other working examples; column 2, line 43-45 and 55-58).



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10. Claims 11-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okazoe et al. (US 5,586,626 B2 or its equivalent WO 2000/56694) in view of Connolly et al. (US 3,282,875).

Regarding the monomer/polymer limitation of four parent **Claims 11, 12, 15 and 17**, **Okazoe et al.** have already disclosed the preparation of compound (Ve-50) from thermal decomposition of compound (Vd-50) with NaF powder (see Ve-50 at column 37, line 1-28; see Vd-50 at column 36, line 8-65).

11. **In a very closed examination, Okazoe is silent about two things as: (A) pyrolysis of the compound Ve-50 to produce trifluorovinyl group as monomeric moiety, and (B) attaching fluorosulfonyl functional group on the CF<sub>3</sub> group.** Connolly has taught both things. For instance, monomer and its polymer carrying an ether linkage with fluorosulfonyl end functional group can be prepared through the same thermal decomposition of the same kind of acid fluoride as already specified above by Okazoe (see column 1, line 17-37; column 1, line 66 – column 2, line 36; see all working examples on columns 3-9). By doing so, the fluorosulfonyl groups in the polymer is readily subjected to many known reactions of sulfonyl groups so as to produce many ionomeric products with unique properties well known in the art to be useful in the area of battery and fuel cell (column 2, line 68 – column 3, line 8).

In light of the fact that both involving references are dealing with making fluorine-containing polymers particularly with ether type linkage, one having ordinary skill in the art

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would therefore have found it obvious to perform synthetic methodology so as to modify Okazoe's monomer preparation process with the attachment of fluorosulfonyl functional group on the R<sup>1</sup> group at the end position and the generation of trifluorovinyl monomeric moiety as taught by Connolly. By doing so, one would expect it succeed in making polymers from such a trifluorovinyl monomeric moiety. Additionally, many ionomeric products with unique properties well known in the art to be useful in the area of battery and fuel cell may be thereby obtained.

12. Regarding **Claims 13 and 16**, Connolly has demonstrated the preparation of many copolymers from fluorosulfonyl-containing monomer (see all working examples).

Regarding **Claim 14**, sulfonic acid or its metal salt in the form of monomer or polymer can be readily obtained from the conversion of fluorosulfonyl functional group with **alkali hydrolysis** (see Connolly at column 3, line 58-69 as well as other working examples; column 2, line 43-45 and 55-58).

### ***Conclusion***

13. Any inquiry concerning this communication or earlier communication from the examiner should be directed to **Dr. Henry S. Hu** whose telephone number is **(571) 272-1103**. The examiner can be reached on Monday through Friday from 9:00 AM –5:00 PM.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Wu, can be reached on (571) 272-1114. The **fax** number for the organization where this application or proceeding is assigned is **(571) 273-8300** for all regular communications.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Henry S. Hu

Patent Examiner, Art Unit 1713, USPTO

June 6, 2006



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